



## Appendix – Class I, Class II

EPA.gov Class I Injection Wells

EPA.gov Class II Injection Wells

# From EPA.GOV:

## Class I Industrial and Municipal Waste Disposal Wells

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### Use of Class I wells

Class I wells are used to inject hazardous and non-hazardous wastes into deep, confined rock formations. Class I wells are typically drilled thousands of feet below the lowermost underground source of drinking water (USDW). Approximately 800 operational Class I wells exist in the United States. The geologies of the Gulf Coast and the Great Lakes areas are best suited for these types of wells. Most Class I wells are found in there.

Examples of industries that use Class I wells include:

- Petroleum refining
- Metal production
- Chemical production
- Pharmaceutical production
- Commercial disposal
- Food production
- Municipal wastewater treatment

Based upon the characteristics of the fluids injected, Class I wells fall into one of four subcategories.

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# Hazardous waste disposal wells

Industry injects hazardous waste through Class I wells, as defined by the Resource Conservation and Recovery Act (RCRA). Class I wells are strictly regulated under RCRA and the Safe Drinking Water Act (SDWA). Construction, permitting, operating, and monitoring requirements are more stringent for Class I hazardous waste disposal wells than for other Class I injection well categories.

Approximately 17 percent of Class I wells are hazardous waste disposal wells. Most Class I hazardous waste wells are located at industrial facilities and dispose of waste generated onsite. These wells are operated in 10 states with the majority in Texas and Louisiana. Only a few commercial Class I wells accept hazardous waste generated offsite.

The Hazardous and Solid Waste Amendments (HSWA) to the RCRA added significant restrictions on the disposal of hazardous waste. Under these amendments, land disposal of hazardous wastes, which includes Class I hazardous waste injection wells, is prohibited unless the:

- Waste has been treated to become non-hazardous or;
- Disposer can demonstrate that the waste will remain where it has been placed for as long as it remains hazardous, which has been defined as 10,000 years by regulation.

[Learn more about the impact of the RCRA land disposal restrictions on Class I hazardous waste injection wells.](#)

In 2001, EPA published “Class I Underground Injection Control Program: Study of the Risks Associated with Class I Underground Injection Wells.” The report:

- Synthesizes existing information on the Class I program
- Documents studies of the risks to human health or the environment posed by Class I injection wells

[Review EPA's study, Class I Underground Injection Control Program: Study of the Risks Associated with Class I Underground Injection Wells.](#)

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# Non-hazardous industrial waste disposal wells

Approximately 53 percent of Class I wells provide for injection of non-hazardous industrial waste. Disposal of non-hazardous industrial waste occurs at injection wells operating in 19 states. The majority of these wells are in Texas, California, Louisiana, Kansas, and Wyoming.

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# Municipal wastewater disposal wells

Approximately 30 percent of Class I wells are municipal wastewater disposal wells. These wells are located exclusively in Florida.

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# Radioactive waste disposal wells

This sub-class of well may be used to inject waste that contains radioactive material. No known radioactive waste disposal wells operating in the United States.

# From EPA.GOV:

## Class II Oil and Gas Related Injection Wells

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### Use of Class II wells

Class II wells are used only to inject fluids associated with oil and natural gas production. Class II fluids are primarily brines (salt water) that are brought to the surface while producing oil and gas. It is estimated that over 2 billion gallons of fluids are injected in the United States every day. Most oil and gas injection wells are in Texas, California, Oklahoma, and Kansas.

The number of Class II wells varies from year to year based on fluctuations in oil and gas demand and production. Approximately 180,000 Class II wells are in operation in the United States.

Class II wells fall into one of three categories.

- Disposal wells
- Enhanced recovery wells
- Hydrocarbon storage wells

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### Class II well types

#### Disposal wells

During oil and gas extraction, brines are also brought to the surface. Brines are separated from hydrocarbons at the surface and reinjected into the same or similar underground formations for disposal. Wastewater from hydraulic fracturing activities can also be injected into Class II wells. Class II disposal wells make up about 20 percent of the total number of Class II wells.

#### Enhanced recovery wells

Fluids consisting of brine, freshwater, steam, polymers, or carbon dioxide are injected into oil-bearing formations to recover residual oil and in limited applications, natural gas.



The injected fluids thin (decrease the viscosity) or displace small amounts of extractable oil and gas. Oil and gas is then available for recovery. In a typical configuration, a single injection well is surrounded by multiple production wells that bring oil and gas to the surface.

Enhanced recovery wells are the most numerous type of Class II wells. They represent as much as 80 percent of the total number of Class II wells.

### **Hydrocarbon storage wells**

Liquid hydrocarbons are injected into underground formations (such as salt caverns) where they are stored, generally, as part of the U.S. Strategic Petroleum Reserve.

Over 100 liquid hydrocarbon storage wells operate in the United States.

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## **Protecting drinking water resources**

Extraction of oil and gas usually produces large amounts of brine. Often saltier than seawater, this brine can contain toxic metals and radioactive substances. Brines can damage the environment and public health if discharged to water or land. Deep underground injection of brines in formations isolated from underground sources of drinking water prevents soil and water contamination.

When states began to implement rules preventing disposal of brine to surface water bodies and soils, injection became the preferred way to dispose of this waste fluid. All oil and gas producing states require the injection of brine into the originating formation or similar formations.

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## **Class II well requirements**

States (including federally recognized tribes and U.S. territories) have the option of requesting primacy for Class II wells under either Section 1422 or 1425 of the SDWA.

Under Section 1422 states must meet EPA's minimum requirements for UIC programs. Programs authorized under section 1422 must include well owner and operator requirements for:

- Construction
- Operation
- Monitoring and testing
- Reporting
- Closure requirements

Under Section 1422 enhanced recovery wells may either be issued permits or be authorized by rule. Disposal wells are issued permits. The owners or operators of the wells must meet all applicable requirements, including strict construction and conversion standards and regular testing and inspection. Under Section 1425 states must demonstrate that their existing standards are effective in preventing endangerment of USDWs. These programs must include requirements for:

- Permitting
- Inspections
- Monitoring
- Record-keeping
- Reporting